



A Moving-Boundary Problem: Modeling, Analysis and Simulation of Concrete Carbonation

By Adrian Muntean

Cuvillier Verlag Mai 2006, 2006. Taschenbuch. Book Condition: Neu. 207x147x12 mm. Neuware - Environmental impact on concrete parts of buildings results in a variety of unwanted chemical and chemically-induced mechanical changes. The bulk of these changes leads to damaging and destabilization of the concrete itself or of the reinforcement embedded in the concrete. One important destabilization factor is the drop in pH near the steel bars induced by carbonation of the alkaline constituents. This is caused by atmospheric carbon dioxide diffusing in the dry parts and reacting in the wet parts of the concrete pores. The phenomenon is considered as one of the major processes inducing corrosion in concrete. A particular feature of carbonation is the formation of macroscopic sharp reaction interfaces or thin reaction layers that progress into the unsaturated concrete-based materials. The deeper cause for the formation of these patterns is not quite clear, although the major chemical and physical reasons seem to be known. The main objective of this work is to understand the movement of internal reaction layers in order to be able to predict the carbonation penetration. We describe several relevant settings of the carbonation process by means of moving-reaction interface formulations. Non-local dynamic laws...

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